Understanding the effectiveness of open standards for providing access to functions in Next Generation Networks

by

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Certificate of Authorship

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

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Abstract

The traditional telecommunications environment is 'closed', where applications can only be developed internally with specific knowledge of individual network technologies. In the last several years, there has been an enormous increase in efforts to 'open up' these networks for application development, leading to open standards such as the Parlay/OSA APIs. This thesis is primarily concerned with understanding the effectiveness of open standards for providing third party stakeholders with access to functions in Next Generation Networks. Effectiveness in this context is to do with how well open systems may, and can, enable the business aims, and consequent technological advantages to achieve the business aims. We reason about the effectiveness from three perspectives in terms of whether the open standard provides sufficient openness, functional coverage, and practicality. While the methodology and models are applicable to evaluating open standards in general, we specifically apply them to the QoS control functionality provided by the Parlay/OSA Connectivity Manager Service Capability Feature.

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Abbreviations

3GPP	Third Generation Partnership Program
7750SR	Alcatel-Lucent 7750 Service Router
ACCC	Australian Competition and Consumer Commission
AF	Application Function
AHV	Application Host Vendor
API	Application Programming Interface
AplP	Appliance Provider
AplV	Appliance Vendor
ARIB	Association of Radio Industries and Businesses (Japan)
ASIC	Application Specific Integrated Circuit
ASP	Application Service Provider
ATIS	Alliance for Telecommunications Industry Solutions (North America)
ATM	Asynchronous Transfer Mode
BGP	Border Gateway Protocol
CAMEL	Customized Applications for Mobile network Enhanced Logic
CATV	Cable Television
CCSA	China Communications Standards Association
CDMA	Code Division Multiple Access
COPS	Common Open Policy Service
CORBA	Common Object Request Broker Architecture
CoS	Class of Service
COTS	Commercial Off The Shelf
CP	Connectivity Provider

CPE	Customer Premises Equipment
CR-LDP	Constraint based Label Distribution Protocol
CTI	Computer Telephony Integration
DECT	Digital Enhanced Cordless Telecommunications
DHCP	Dynamic Host Configuration Protocol
DSL	Digital Subscriber Line
DSTO	Defence Science Technology Organization
ED	Experimental Design
EDGE	Enhanced Data rates for GSM Evolution
FW	Firewall
eTOM	Enhanced Telecommunications Operations Map
ETSI	European Telecommunications Standards Institute
FAB	Fulfilment, Assurance and Billing
FCAPS	Fault, Configuration, Accounting, Performance and Security
FGNGN	ITU-T Focus Group on Next Generation Networks
FTP	File Transfer Protocol
FTTH	Fiber To The Home
GII	Global Information Infrastructure
GSM	Global System for Mobile communications
GW	Gateway
HDTV	High Definition Television
HTTP	Hypertext Transfer Protocol
IAD	Integrated Access Device
ICT	Information and Communications Technology
IDL	Interface Definition Language
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IETF	Internet Engineering Task Force
IMAP	Internet Message Access Protocol
IMS	IP Multimedia Subsystem
IN	Intelligent Network

INAP	Intelligent Network Application Part
IP	Internet Protocol
IPR	Intellectual Property Rights
IPTV	Internet Protocol Television
IS	Information System
IS-95	Interim Standard 95 (for CDMA)
ISO	International Organization for Standardization
ITU-T	International Telecommunication Union—Telecommunication Standardization Sector
JAIN	Java APIs for Integrated Networks
LSP	Label Switched Path
MEEN	Management of Enriched Experience Networks
MPLS	Multi Protocol Label Switching
NAT	Network Address Translation
NAPT	Network Address and Port Translation
NGN	Next Generation Network
NIV	Network Infrastructure Vendor
NMS	Network Management System
NSI	Network Service Interface
NSIS	Next Steps in Signaling
OASIS	Organization for the Advancement of Structured Information Standards
OMG	Object Management Group
OSA	Open Service Access
OSE	Open Systems Engineering
OSEM	OSE Measures
OSI-BRM	Open Systems Interconnection—Basic Reference Model
OSPF	Open Shorted Path First
OSS	Operational Support System
PADI	PPPoE Active Discovery Initiation
PADO	PPPoE Active Discovery Offer

PC	Personal Computer
PDA	Personal Digital Assistant
PEST	Political, Economic, Social-Cultural and Technological
PHB	Per Hob Behaviour
PLMN	Public Land Mobile Network
PPP/LCP	Point to Point Protocol / Link Control Protocol
PPPoE	Point to Point Protocol over Ethernet
PPTP	Point to Point Tunneling Protocol
POP	Point of Presence or Post Office Protocol
POSIX	Portable Operating System Interface
PSTN	Public Switched Telephone Network
QoS	Quality of Service
RA	Broker / Retail Agent
RACS	Resource Admission Control Subsystem
RIP	Routing Information Protocol
RMI	Java Remote Method Invocation
RSVP-TE	Resource Reservation Protocol with Traffic Engineering
RTSP	Realtime Streaming Protocol
SAML	Security Assertion Markup Language
SAMSON	Service Access Model for Standardized Open Networks
SAP	Service Access Point
SCF	Service Capability Feature
SCP	Service Control Point
SCS	Service Capability Server
SDLC	Software Development Life-Cycle
SDO	Standards Development Organization
SDP	Service Delivery Platform
SEI	Software Engineering Institute
SIMPSON	SIgnaling Model for Programmable Services on Networks
SIP	Session Initiation Protocol
SIV	Support Infrastructure Vendor

SLEE	Service Logic Execution Environment
SMTP	Simple Mail Transport Protocol
SNMP	Simple Network Management Protocol
SOA	Service Oriented Architecture
SOLO	Structure of the Observed Learning Outcome
SS7	Signaling System #7
SSO	Standard Setting Organization
STB	Set Top Box
TCP	Transmission Control Protocol
TD-CDMA	Time Division CDMA
TINA-C	Telecommunications Information Networking Architecture Consortium
TISPAN	Telecoms & Internet converged Services & Protocols for Advanced Networks
TMF	Tele Management Forum
TMN	Telecommunications Management Network
TTA	Telecommunications Technology Association (Korea)
TTC	Telecommunication Technology Committee (Japan)
UDDI	Universal Description, Discovery, and Integration
UML	Unified Modeling Language
UMTS	Universal Mobile Telecommunications System
VC	Virtual Circuit
VoD	Video on Demand
VoIP	Voice over Internet Protocol
VPN	Virtual Private Network
VPrN	Virtual Provisioned Network
VPrP	Virtual Provisioned Pipe
W-CDMA	Wideband CDMA
W3C	World Wide Web Consortium
WFQ	Weighted Fair Queuing
WSDL	Web Services Description Language

WSLA	Web Service Level Agreements
XML	Extensible Mark-up Language